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SEQUENCE LISTING

<110> Dalemans, Wilfried L.J.  
Gerard, Catherine Marie Ghislaine

<120> Vaccine

<130> B45124

<140> 09/581,976

<141> 2000-06-20

<150> PCT/EP98/08563

<151> 1998-12-18

<150> GB 9727262.9

<151> 1997-12-24

<160> 28

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<212> PRT

<213> Artificial Sequence

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<223> Chimaeric protein (protein D from Haemophilus  
influenza B and E7 from Human papilloma virus type  
16)

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Ser	Asp	Lys	Ile	Ile	Ile	Ala	His	Arg	Gly	Ala	Ser	Gly	Tyr	Leu	Pro
			20					25					30		
Glu	His	Thr	Leu	Glu	Ser	Lys	Ala	Leu	Ala	Phe	Ala	Gln	Gln	Ala	Asp
			35					40					45		
Tyr	Leu	Glu	Gln	Asp	Leu	Ala	Met	Thr	Lys	Asp	Gly	Arg	Leu	Val	Val
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all cancelled  
per P. #34

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 65 70 75 80  
 Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr  
 85 90 95  
 Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met  
 100 105 110  
 Ala Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu  
 115 120 125  
 Gln Pro Glu Thr Thr Asp Leu Tyr Cys Tyr Glu Gln Leu Asn Asp Ser  
 130 135 140  
 Ser Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro  
 145 150 155 160  
 Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser  
 165 170 175  
 Thr Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu  
 180 185 190  
 Glu Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro Ile Cys Ser  
 195 200 205  
 Gln Lys Pro Thr Ser Gly His His His His His His  
 210 215 220

<210> 2

<211> 663

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus  
 influenza B and E7 from Human papilloma virus type  
 16)

<400> 2

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 attattgctc accgtggtgc tagcggttat ttaccagagc atacgttaga atctaaagca 120  
 cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt 180  
 cgtttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaatc 240  
 ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt 300  
 caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggaga tacacctaca 360  
 ttgcatgaat atatgttaga ttgcaacca gagacaactg atctctactg ttatgagcaa 420  
 ttaaattgaca gctcagagga ggaggatgaa atagatggtc cagctggaca agcagaaccg 480  
 gacagagccc attacaatat tgtaaccttt tgttgcaagt gtgactctac gcttcggttg 540  
 tgcgtacaaa gcacacacgt agacattcgt actttggaag acctgttaat gggcacacta 600  
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taa

663

<210> 3  
<211> 822  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Chimaeric protein (protein D from Haemophilus  
influenza B and E6 from Human papilloma virus type  
16)

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cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt 180  
cgtttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaattc 240  
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg acittacctt aaaagaaatt 300  
caaagtttag aaatgacaga aaactttgaa accatggcca tgtttcagga cccacaggag 360  
cgaccagaa agttaccaca gttatgcaca gagctgcaaa caactataca tgatataata 420  
ttagaatgtg tgtactgcaa gcaacagtta ctgcgacgtg aggtatatga ctttgctttt 480  
cgggatttat gcatagtata tagagatggg aatccatatg ctgtatgtga taaatgttta 540  
aagttttatt ctaaaattag tgagtataga cattattgtt atagtttgta tggaacaaca 600  
ttagaacagc aatacaacaa accgttgtgt gatttgttaa ttaggtgtat taactgtcaa 660  
aagccactgt gtcctgaaga aaagcaaaga catctggaca aaaagcaaag attccataat 720  
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gaaaccagc tgactagtgg ccaccatcac catcaccatt aa 822

<210> 4  
<211> 273  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Chimaeric protein (protein D from Haemophilus  
influenza B and E6 from Human papilloma virus type  
16)

<400> 4  
Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys  
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Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro

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Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp		
35	40	45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val		
50	55	60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe		
65	70	75
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr		
85	90	95
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met		
100	105	110
Ala Met Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu		
115	120	125
Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val		
130	135	140
Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe		
145	150	155
Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Cys		
165	170	175
Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr		
180	185	190
Cys Tyr Ser Leu Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro		
195	200	205
Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys Pro Leu Cys		
210	215	220
Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn		
225	230	235
Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser		
245	250	255
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260	265	270
His		

<210> 5

<211> 1116

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus influenza B and E6E7 fusion from Human papilloma virus type 16)

<400> 5

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attattgctc accgtggtgc tagcggttat ttaccagagc atacgttaga atctaaagca 120  
cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt 180  
cgtttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaatc 240  
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt 300  
caaagtttag aaatgacaga aaactttgaa accatggcca tgtttcagga cccacaggag 360  
cgaccagaa agttaccaca gttatgcaca gagctgcaaa caactataca tgatataata 420  
ttagaatgtg tgtactgcaa gcaacagtta ctgcgacgtg aggtatatga ctttgctttt 480  
cgggatttat gcatagtata tagagatggg aatccatatg ctgtatgtga taaatgttta 540  
aagttttatt ctaaaattag tgagtataga cattattgtt atagtttgta tggaacaaca 600  
ttagaacagc aatacaacaa accgttggtg gatttggtta ttaggtgtat taactgtcaa 660  
aagccactgt gtcctgaaga aaagcaaaga catctggaca aaaagcaaag attccataat 720  
ataaggggtc ggtggaccgg tcgatgtatg tcttggttga gatcatcaag aacacgtaga 780  
gaaaccagc tgatgcatgg agatacacct acattgcatg aatatatgtt agatttgcaa 840  
ccagagacaa ctgatctcta ctgttatgag caattaaatg acagctcaga ggaggaggat 900  
gaaatagatg gtccagctgg acaagcagaa cggacagag cccattacaa tattgtaacc 960  
ttttgttgca agtgtgactc tacgcttcgg ttgtgogtac aaagcacaca cgtagacatt 1020  
cgtactttgg aagacctgtt aatgggcaca ctaggaattg tgtgccccat ctgttctcag 1080  
aaaccaacta gtggccacca tcaccatcac catta 1116

<210> 6

<211> 371

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus  
influenza B and E6E7 fusion from Human papilloma  
virus type 16)

<400> 6

Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys  
1 5 10 15  
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro  
20 25 30  
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp  
35 40 45  
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val  
50 55 60  
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe  
65 70 75 80

Pro	His	Arg	His	Arg	Lys	Asp	Gly	Arg	Tyr	Tyr	Val	Ile	Asp	Phe	Thr			
				85					90					95				
Leu	Lys	Glu	Ile	Gln	Ser	Leu	Glu	Met	Thr	Glu	Asn	Phe	Glu	Thr	Met			
			100					105					110					
Ala	Met	Phe	Gln	Asp	Pro	Gln	Glu	Arg	Pro	Arg	Lys	Leu	Pro	Gln	Leu			
		115					120					125						
Cys	Thr	Glu	Leu	Gln	Thr	Thr	Ile	His	Asp	Ile	Ile	Leu	Glu	Cys	Val			
	130					135					140							
Tyr	Cys	Lys	Gln	Gln	Leu	Leu	Arg	Arg	Glu	Val	Tyr	Asp	Phe	Ala	Phe			
145					150					155					160			
Arg	Asp	Leu	Cys	Ile	Val	Tyr	Arg	Asp	Gly	Asn	Pro	Tyr	Ala	Val	Cys			
				165					170					175				
Asp	Lys	Cys	Leu	Lys	Phe	Tyr	Ser	Lys	Ile	Ser	Glu	Tyr	Arg	His	Tyr			
		180						185					190					
Cys	Tyr	Ser	Leu	Tyr	Gly	Thr	Thr	Leu	Glu	Gln	Gln	Tyr	Asn	Lys	Pro			
	195						200					205						
Leu	Cys	Asp	Leu	Leu	Ile	Arg	Cys	Ile	Asn	Cys	Gln	Lys	Pro	Leu	Cys			
	210					215					220							
Pro	Glu	Glu	Lys	Gln	Arg	His	Leu	Asp	Lys	Lys	Gln	Arg	Phe	His	Asn			
225					230					235					240			
Ile	Arg	Gly	Arg	Trp	Thr	Gly	Arg	Cys	Met	Ser	Cys	Cys	Arg	Ser	Ser			
			245					250					255					
Arg	Thr	Arg	Arg	Glu	Thr	Gln	Leu	Met	His	Gly	Asp	Thr	Pro	Thr	Leu			
		260					265						270					
His	Glu	Tyr	Met	Leu	Asp	Leu	Gln	Pro	Glu	Thr	Thr	Asp	Leu	Tyr	Cys			
	275					280						285						
Tyr	Glu	Gln	Leu	Asn	Asp	Ser	Ser	Glu	Glu	Glu	Asp	Glu	Ile	Asp	Gly			
	290					295					300							
Pro	Ala	Gly	Gln	Ala	Glu	Pro	Asp	Arg	Ala	His	Tyr	Asn	Ile	Val	Thr			
305					310					315					320			
Phe	Cys	Cys	Lys	Cys	Asp	Ser	Thr	Leu	Arg	Leu	Cys	Val	Gln	Ser	Thr			
			325					330					335					
His	Val	Asp	Ile	Arg	Thr	Leu	Glu	Asp	Leu	Leu	Met	Gly	Thr	Leu	Gly			
		340					345					350						
Ile	Val	Cys	Pro	Ile	Cys	Ser	Gln	Lys	Pro	Thr	Ser	Gly	His	His	His			
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His	His	His																
	370																	

<210> 7  
 <211> 663  
 <212> DNA  
 <213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus  
influenza B and mutated E7 from Human papilloma  
virus type 16)

<400> 7

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cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt      180
cgttttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaatc      240
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt      300
caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggga tacacctaca      360
ttgcatgaat atatgttaga ttgcaacca gagacaactg atctctacgg ttatcagcaa      420
ttaaattgaca gctcagagga ggaggatgaa atagatggtc cagctggaca agcagaaccg      480
gacagagccc attacaatat tgtaaccttt tgttgcaagt gtgactctac gcttcggttg      540
tgcgtacaaa gcacacacgt agacattcgt actttggaag accgttaat gggcacacta      600
ggaattgtgt gcccatctg ttctcagaaa ccaactagtg gccaccatca ccatcaccat      660
taa                                                                                   663
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<210> 8

<211> 220

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus  
influenza B and mutated E7 from Human papilloma  
virus type 16)

<400> 8

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 1              5              10              15
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
      20              25              30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
      35              40              45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
      50              55              60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
      65              70              75              80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
      85              90              95
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Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met  
 100 105 110  
 Ala Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu  
 115 120 125  
 Gln Pro Glu Thr Thr Asp Leu Tyr Gly Tyr Gln Gln Leu Asn Asp Ser  
 130 135 140  
 Ser Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro  
 145 150 155 160  
 Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser  
 165 170 175  
 Thr Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu  
 180 185 190  
 Glu Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro Ile Cys Ser  
 195 200 205  
 Gln Lys Pro Thr Ser Gly His His His His His His  
 210 215 220

<210> 9

<211> 879

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (Clyta from Streptococcus  
 pneumoniae and E6 from Human papilloma virus type  
 16)

<400> 9

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aatggcactt ggtactactt tgacagttca ggctatatgc ttgcagaccg ctggaggaag	120
cacacagacg gcaactggta ctggttcgac aactcagggc aaatgggtac aggctggaag	180
aaaatcgctg ataagtggta ctatttcaac gaagaagggtg ccatgaagac aggctgggtc	240
aagtacaagg acacttggta ctacttagac gctaaagaag gcgccatggt atcaaagtgc	300
tttatccagt cagcggacgg aacaggctgg tactacctca aaccagacgg aacactggca	360
gacaggccag aattggccag catgctggac atggccatgt ttcaggaccc acaggagcga	420
cccagaaagt taccacagtt atgcacagag ctgcaaacaa ctatacatga tataatatta	480
gaatgtgtgt actgcaagca acagttactg cgacgtgagg tatatgactt tgcttttcgg	540
gatttatgca tagtatatag agatgggaat ccatatgctg tatgtgataa atgtttaaag	600
ttttattcta aaattagtga gtatagacat tattgttata gtttgtatgg aacaacatta	660
gaacagcaat acaacaaacc gttgtgtgat ttgttaatta ggtgtattaa ctgtcaaaag	720
ccactgtgtc ctgaagaaaa gcaaagacat ctggacaaaa agcaaagatt ccataatata	780
aggggtcggt ggaccggtcg atgtatgtct tgttgcagat catcaagaac acgtagagaa	840
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<210> 10  
<211> 292  
<212> PRT  
<213> Artificial Sequence

<220>

<223> Chimaeric protein (Clyta from Streptococcus pneumoniae and E6 from Human papilloma virus type 16)

<400> 10

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Phe Glu Lys Ile Asn Gly Thr Trp Tyr Tyr Phe Asp Ser Ser Gly Tyr  
20 25 30  
Met Leu Ala Asp Arg Trp Arg Lys His Thr Asp Gly Asn Trp Tyr Trp  
35 40 45  
Phe Asp Asn Ser Gly Glu Met Ala Thr Gly Trp Lys Lys Ile Ala Asp  
50 55 60  
Lys Trp Tyr Tyr Phe Asn Glu Glu Gly Ala Met Lys Thr Gly Trp Val  
65 70 75 80  
Lys Tyr Lys Asp Thr Trp Tyr Tyr Leu Asp Ala Lys Glu Gly Ala Met  
85 90 95  
Val Ser Asn Ala Phe Ile Gln Ser Ala Asp Gly Thr Gly Trp Tyr Tyr  
100 105 110  
Leu Lys Pro Asp Gly Thr Leu Ala Asp Arg Pro Glu Leu Ala Ser Met  
115 120 125  
Leu Asp Met Ala Met Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu  
130 135 140  
Pro Gln Leu Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu  
145 150 155 160  
Glu Cys Val Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp  
165 170 175  
Phe Ala Phe Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr  
180 185 190  
Ala Val Cys Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr  
195 200 205  
Arg His Tyr Cys Tyr Ser Leu Tyr Gly Thr Thr Leu Glu Gln Gln Tyr  
210 215 220  
Asn Lys Pro Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys  
225 230 235 240  
Pro Leu Cys Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg



Met	Lys	Gly	Gly	Ile	Val	His	Ser	Asp	Gly	Ser	Tyr	Pro	Lys	Asp	Lys
1				5					10					15	
Phe	Glu	Lys	Ile	Asn	Gly	Thr	Trp	Tyr	Tyr	Phe	Asp	Ser	Ser	Gly	Tyr
		20						25					30		
Met	Leu	Ala	Asp	Arg	Trp	Arg	Lys	His	Thr	Asp	Gly	Asn	Trp	Tyr	Trp
		35					40						45		
Phe	Asp	Asn	Ser	Gly	Glu	Met	Ala	Thr	Gly	Trp	Lys	Lys	Ile	Ala	Asp
	50					55					60				
Lys	Trp	Tyr	Tyr	Phe	Asn	Glu	Glu	Gly	Ala	Met	Lys	Thr	Gly	Trp	Val
65					70					75					80
Lys	Tyr	Lys	Asp	Thr	Trp	Tyr	Tyr	Leu	Asp	Ala	Lys	Glu	Gly	Ala	Met
			85						90					95	
Val	Ser	Asn	Ala	Phe	Ile	Gln	Ser	Ala	Asp	Gly	Thr	Gly	Trp	Tyr	Tyr
		100						105					110		
Leu	Lys	Pro	Asp	Gly	Thr	Leu	Ala	Asp	Arg	Pro	Glu	Leu	Ala	Ser	Met
	115						120					125			
Leu	Asp	Met	Ala	Met	His	Gly	Asp	Thr	Pro	Thr	Leu	His	Glu	Tyr	Met
	130					135					140				
Leu	Asp	Leu	Gln	Pro	Glu	Thr	Thr	Asp	Leu	Tyr	Cys	Tyr	Glu	Gln	Leu
145				150						155					160
Asn	Asp	Ser	Ser	Glu	Glu	Glu	Asp	Glu	Ile	Asp	Gly	Pro	Ala	Gly	Gln
			165						170					175	
Ala	Glu	Pro	Asp	Arg	Ala	His	Tyr	Asn	Ile	Val	Thr	Phe	Cys	Cys	Lys
		180						185					190		
Cys	Asp	Ser	Thr	Leu	Arg	Leu	Cys	Val	Gln	Ser	Thr	His	Val	Asp	Ile
	195						200					205			
Arg	Thr	Leu	Glu	Asp	Leu	Leu	Met	Gly	Thr	Leu	Gly	Ile	Val	Cys	Pro
	210					215					220				
Ile	Cys	Ser	Gln	Lys	Pro	Thr	Ser	Gly	His	His	His	His	His	His	His
225				230						235					

<210> 13

<211> 1173

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimeric protein (Clyta from Streptococcus pneumoniae and E6E7 fusion from Human papilloma virus type 16)

<400> 13

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60

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cacacagacg gcaactggta ctggttcgac aactcaggcg aaatggctac aggctggaag	180
aaaatcgctg ataagtggta ctatttcaac gaagaagggtg ccatgaagac aggctgggtc	240
aagtacaagg acaacttggtg ctacttagac gctaaagaag gcgccatggt atcaaatgcc	300
tttatccagt cagcggacgg aacaggctgg tactacctca aaccagacgg aacactggca	360
gacaggccag aattggccag catgctggac atggccatgt ttcaggaccc acaggagcga	420
cccagaaagt taccacagtt atgcacagag ctgcaaacaa ctatacatga tataatatta	480
gaatgtgtgt actgcaagca acagttactg cgacgtgagg tatatgactt tgcttttcgg	540
gatttatgca tagtatatag agatgggaat ccatatgctg tatgtgataa atgttttaag	600
ttttattcta aaattagtga gtatagacat tattgttata gtttgtatgg aacaacatta	660
gaacagcaat acaacaaacc gttgtgtgat ttgttaatta ggtgtattaa ctgtcaaaag	720
ccactgtgtc ctgaagaaaa gcaaagacat ctggacaaaa agcaaagatt ccataatata	780
aggggtcggg ggaccggtcg atgtatgtct tgttgacagat catcaagaac acgtagagaa	840
accagctga tgcattggaga tacacctaca ttgcatgaat atatgttaga tttgcaacca	900
gagacaactg atctctactg ttatgagcaa ttaaattgaca gctcagagga ggaggatgaa	960
atagatggtc cagctggaca agcagaaccg gacagagccc attacaatat tgtaaccttt	1020
tgttgcaagt gtgactctac gcttcggttg tgcgtacaaa gcacacacgt agacattcgt	1080
actttggaag acctgttaat gggcacacta ggaattgtgt gccccatctg ttctcagaaa	1140
ccaactagtg gccaccatca ccataccat taa	1173

<210> 14

<211> 390

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (Clyta from Streptococcus pneumoniae and E6E7 fusion from Human papilloma virus type 16)

<400> 14

Met Lys Gly Gly Ile Val His Ser Asp Gly Ser Tyr Pro Lys Asp Lys	
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20 25 30	
Met Leu Ala Asp Arg Trp Arg Lys His Thr Asp Gly Asn Trp Tyr Trp	
35 40 45	
Phe Asp Asn Ser Gly Glu Met Ala Thr Gly Trp Lys Lys Ile Ala Asp	
50 55 60	
Lys Trp Tyr Tyr Phe Asn Glu Glu Gly Ala Met Lys Thr Gly Trp Val	
65 70 75 80	
Lys Tyr Lys Asp Thr Trp Tyr Tyr Leu Asp Ala Lys Glu Gly Ala Met	
85 90 95	



<220>

<223> Chimaeric protein (protein D from Haemophilus  
influenza B and E7 from Human papilloma virus type  
18)

<400> 15

atggatccaa gcagccattc atcaaatatg gccaataccc aaatgaaatc agacaaaatc	60
attattgctc accgtggtgc tagcggttat ttaccagagc atacgttaga atctaaagca	120
cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt	180
cgttttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaatc	240
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt	300
caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggacc taaggcaaca	360
ttgcaagaca ttgtattgca tttagagccc caaaatgaaa ttccggttga ccttctatgt	420
cacgagcaat taagcgactc agaggaagaa aacgatgaaa tagatgaagt taatcatcaa	480
catttaccag cccgacgagc cgaaccacaa cgtcacacaa tgttgtgtat gtgttgtaag	540
tgtgaagcca gaattgagct agtagtagaa agtcacgag acgaccttcg agcattccag	600
cagctgtttc tgaacaccct gtcctttgtg tgtccgtggt gtgcatccca gcagactagt	660
ggccaccatc accatcacca ttaa	684

<210> 16

<211> 227

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus  
influenza B and E7 from Human papilloma virus type  
18)

<400> 16

Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys	
1	5 10 15
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro	
20	25 30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp	
35	40 45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val	
50	55 60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe	
65	70 75 80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr	
85	90 95

Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met  
 100 105 110  
 Ala Met His Gly Pro Lys Ala Thr Leu Gln Asp Ile Val Leu His Leu  
 115 120 125  
 Glu Pro Gln Asn Glu Ile Pro Val Asp Leu Leu Cys His Glu Gln Leu  
 130 135 140  
 Ser Asp Ser Glu Glu Glu Asn Asp Glu Ile Asp Glu Val Asn His Gln  
 145 150 155 160  
 His Leu Pro Ala Arg Arg Ala Glu Pro Gln Arg His Thr Met Leu Cys  
 165 170 175  
 Met Cys Cys Lys Cys Glu Ala Arg Ile Glu Leu Val Val Glu Ser Ser  
 180 185 190  
 Ala Asp Asp Leu Arg Ala Phe Gln Gln Leu Phe Leu Asn Thr Leu Ser  
 195 200 205  
 Phe Val Cys Pro Trp Cys Ala Ser Gln Gln Thr Ser Gly His His His  
 210 215 220  
 His His His  
 225

<210> 17  
 <211> 109  
 <212> PRT  
 <213> Escherichia coli

<400> 17  
 Met Ser Asp Lys Ile Ile His Leu Thr Asp Asp Ser Phe Asp Thr Asp  
 1 5 10 15  
 Val Leu Lys Ala Asp Gly Ala Ile Leu Val Asp Phe Trp Ala Glu Trp  
 20 25 30  
 Cys Gly Pro Cys Lys Met Ile Ala Pro Ile Leu Asp Glu Ile Ala Asp  
 35 40 45  
 Glu Tyr Gln Gly Lys Leu Thr Val Ala Lys Leu Asn Ile Asp Gln Asn  
 50 55 60  
 Pro Gly Thr Ala Pro Lys Tyr Gly Ile Arg Gly Ile Pro Thr Leu Leu  
 65 70 75 80  
 Leu Phe Lys Asn Gly Glu Val Ala Ala Thr Lys Val Gly Ala Leu Ser  
 85 90 95  
 Lys Gly Gln Leu Lys Glu Phe Leu Asp Ala Asn Leu Ala  
 100 105

<210> 18  
 <211> 684  
 <212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus influenza B and mutated E7 from Human papilloma virus type 18)

<400> 18

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atggatccaa gcagccattc atcaaatatg gcgaataccc aaatgaaatc agacaaaatc      60
attattgttc accgtggtgc tagcggttat ttaccagagc atacgttaga atctaaagca      120
cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt      180
cgttttagtg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaattc      240
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt      300
caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggacc taaggcaaca      360
ttgcaagaca ttgtattgca tttagagccc caaaatgaaa ttccggttga ctttctaggt      420
caccagcaat taagcgactc agaggaagaa aacgatgaaa tagatggagt taatcatcaa      480
catttaccag cccgacgagc cgaaccacaa cgtcacacaa tgttgtgtat gtgttgtaag      540
tgtgaagcca gaattgagct agtagtagaa agctcagcag acgaccttcg agcattccag      600
cagctgtttc tgaacaccct gtcctttgtg tgtccgtggt gtgcatccca gcagactagt      660
ggccaaccatc accatcacca ttaa                                         684
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<210> 19

<211> 227

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus influenza B and mutated E7 from Human papilloma virus type 18)

<400> 19

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Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
 1              5              10              15
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
 20              25              30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
 35              40              45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
 50              55              60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
 65              70              75              80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
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	85		90		95										
Leu	Lys	Glu	Ile	Gln	Ser	Leu	Glu	Met	Thr	Glu	Asn	Phe	Glu	Thr	Met
	100						105						110		
Ala	Met	His	Gly	Pro	Lys	Ala	Thr	Leu	Gln	Asp	Ile	Val	Leu	His	Leu
	115						120						125		
Glu	Pro	Gln	Asn	Glu	Ile	Pro	Val	Asp	Leu	Leu	Gly	His	Gln	Gln	Leu
	130						135						140		
Ser	Asp	Ser	Glu	Glu	Glu	Asn	Asp	Glu	Ile	Asp	Gly	Val	Asn	His	Gln
145						150				155				160	
His	Leu	Pro	Ala	Arg	Arg	Ala	Glu	Pro	Gln	Arg	His	Thr	Met	Leu	Cys
			165						170				175		
Met	Cys	Cys	Lys	Cys	Glu	Ala	Arg	Ile	Glu	Leu	Val	Val	Glu	Ser	Ser
	180						185						190		
Ala	Asp	Asp	Leu	Arg	Ala	Phe	Gln	Gln	Leu	Phe	Leu	Asn	Thr	Leu	Ser
	195						200					205			
Phe	Val	Cys	Pro	Trp	Cys	Ala	Ser	Gln	Gln	Thr	Ser	Gly	His	His	His
	210					215					220				
His	His	His													
225															

<210> 20

<211> 837

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus influenza virus B and E6 from Human papilloma virus type 18)

<400> 20

atggatccaa	gcagccattc	atcaaatatg	gogaataccc	aatgaaatc	agacaaaatc	60
attattgctc	accgtggtgc	tagcggttat	ttaccagagc	atacgttaga	atctaaagca	120
cttgcgtttg	cacaacaggc	tgattattta	gagcaagatt	tagcaatgac	taaggatggt	180
cgttttagtgg	ttattcacga	tcacttttta	gatggcttga	ctgatgttgc	gaaaaaattc	240
ccacatcgtc	atcgtaaaga	tggccgttac	tatgtcatcg	actttacctt	aaaagaaatt	300
caaagtttag	aaatgacaga	aaactttgaa	accatggcgc	gctttgagga	tccaacacgg	360
cgaccctaca	agctacctga	tctgtgcacg	gaactgaaca	cttcactgca	agacatagaa	420
ataacctgtg	tatattgcaa	gacagtattg	gaacttacag	aggtatttga	atttgcattt	480
aaagatttat	ttgtggtgta	tagagacagt	ataccgcatg	ctgcatgcca	taaatgtata	540
gatttttatt	ctagaattag	agaattaaga	cattattcag	actctgtgta	tggagacaca	600
ttggaaaaac	taactaacac	tgggttatac	aatttattaa	taaggtgcct	gcggtgccag	660
aaaccgttga	atccagcaga	aaaacttaga	caccttaatg	aaaaacgacg	atttcacaac	720

atagctgggc actatagagg ccagtgccat tcgtgctgca accgagcacg acaggaacga 780  
ctccaacgac gcagagaaac acaagtaact agtggccacc atcaccatca ccattaa 837

<210> 21  
<211> 278  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Chimaeric protein (protein D from Haemophilus  
influenza B and E6 from Human papilloma virus type  
18)

<400> 21  
Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys  
1 5 10 15  
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro  
20 25 30  
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp  
35 40 45  
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val  
50 55 60  
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe  
65 70 75 80  
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr  
85 90 95  
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met  
100 105 110  
Ala Arg Phe Glu Asp Pro Thr Arg Arg Pro Tyr Lys Leu Pro Asp Leu  
115 120 125  
Cys Thr Glu Leu Asn Thr Ser Leu Gln Asp Ile Glu Ile Thr Cys Val  
130 135 140  
Tyr Cys Lys Thr Val Leu Glu Leu Thr Glu Val Phe Glu Phe Ala Phe  
145 150 155 160  
Lys Asp Leu Phe Val Val Tyr Arg Asp Ser Ile Pro His Ala Ala Cys  
165 170 175  
His Lys Cys Ile Asp Phe Tyr Ser Arg Ile Arg Glu Leu Arg His Tyr  
180 185 190  
Ser Asp Ser Val Tyr Gly Asp Thr Leu Glu Lys Leu Thr Asn Thr Gly  
195 200 205  
Leu Tyr Asn Leu Leu Ile Arg Cys Leu Arg Cys Gln Lys Pro Leu Asn  
210 215 220  
Pro Ala Glu Lys Leu Arg His Leu Asn Glu Lys Arg Arg Phe His Asn

225                      230                      235                      240  
 Ile Ala Gly His Tyr Arg Gly Gln Cys His Ser Cys Cys Asn Arg Ala  
                          245                      250                      255  
 Arg Gln Glu Arg Leu Gln Arg Arg Arg Glu Thr Gln Val Thr Ser Gly  
                          260                      265                      270  
 His His His His His His  
                          275

<210> 22  
 <211> 1152  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Chimaeric protein (protein D from Haemophilus  
                          influenza B and E6E7 fusion from Human papilloma  
                          virus type 18)

<400> 22  
 atggatccaa gcagccattc atcaaatatg gcgaataccc aaatgaaatc agacaaaatc 60  
 attattgctc accgtggtgc tagcggttat ttaccagagc atacgttaga atctaaagca 120  
 cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt 180  
 cgttttagtg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaattc 240  
 ccacatcgtc atcgtaaaga tggcggttac tatgtcatcg actttacctt aaaagaaatt 300  
 caaagtttag aaatgacaga aaactttgaa accatggcgc gctttgagga tccaacacgg 360  
 cgaccctaca agctacctga tctgtgcacg gaactgaaca cttcactgca agacatagaa 420  
 ataacctgtg tatattgcaa gacagtattg gaacttacag aggtatttga atttgcat 480  
 aaagatttat ttgtggtgta tagagacagt ataccgcatg ctgcatgcca taaatgtata 540  
 gatttttatt ctagaattag agaattaaga cattattcag actctgtgta tggagacaca 600  
 ttggaaaaac taactaacac tgggttatac aatttattaa taagggtgct gcggtgccag 660  
 aaaccgttga atccagcaga aaaacttaga caccttaatg aaaaacgacg atttcacaac 720  
 atagctgggc actatagagg ccagtgccat tctgtctgca accgagcagc acaggaacga 780  
 ctccaacgac gcagagaaac acaagtaatg catggacctt aggcaacatt gcaagacatt 840  
 gtattgcatt tagagcccca aaatgaaatt ccggttgacc ttctatgtca cgagcaatta 900  
 agcgactcag aggaagaaaa cgatgaaata gatggagtta atcatcaaca ttaccagcc 960  
 cgacgagccg aaccacaacg tcacacaatg ttgtgtatgt gttgtaagtg tgaagccaga 1020  
 attgagctag tagtagaaag ctacgcagac gaccttcgag cattccagca gctgtttctg 1080  
 aacaccctgt cctttgtgtg tccgtggtgt gcatcccagc agactagtgg ccaccatcac 1140  
 catcaccatt aa 1152

<210> 23  
 <211> 383  
 <212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus influenza B and E6E7 fusion from Human papilloma virus type 18)

<400> 23

Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys  
1 5 10 15  
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro  
20 25 30  
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp  
35 40 45  
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val  
50 55 60  
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe  
65 70 75 80  
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr  
85 90 95  
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met  
100 105 110  
Ala Arg Phe Glu Asp Pro Thr Arg Arg Pro Tyr Lys Leu Pro Asp Leu  
115 120 125  
Cys Thr Glu Leu Asn Thr Ser Leu Gln Asp Ile Glu Ile Thr Cys Val  
130 135 140  
Tyr Cys Lys Thr Val Leu Glu Leu Thr Glu Val Phe Glu Phe Ala Phe  
145 150 155 160  
Lys Asp Leu Phe Val Val Tyr Arg Asp Ser Ile Pro His Ala Ala Cys  
165 170 175  
His Lys Cys Ile Asp Phe Tyr Ser Arg Ile Arg Glu Leu Arg His Tyr  
180 185 190  
Ser Asp Ser Val Tyr Gly Asp Thr Leu Glu Lys Leu Thr Asn Thr Gly  
195 200 205  
Leu Tyr Asn Leu Leu Ile Arg Cys Leu Arg Cys Gln Lys Pro Leu Asn  
210 215 220  
Pro Ala Glu Lys Leu Arg His Leu Asn Glu Lys Arg Arg Phe His Asn  
225 230 235 240  
Ile Ala Gly His Tyr Arg Gly Gln Cys His Ser Cys Cys Asn Arg Ala  
245 250 255  
Arg Gln Glu Arg Leu Gln Arg Arg Arg Glu Thr Gln Val Met His Gly  
260 265 270  
Pro Lys Ala Thr Leu Gln Asp Ile Val Leu His Leu Glu Pro Gln Asn

275	280	285
Glu Ile Pro Val Asp Leu Leu Cys His Glu Gln Leu Ser Asp Ser Glu		
290	295	300
Glu Glu Asn Asp Glu Ile Asp Gly Val Asn His Gln His Leu Pro Ala		
305	310	315
Arg Arg Ala Glu Pro Gln Arg His Thr Met Leu Cys Met Cys Cys Lys		
325	330	335
Cys Glu Ala Arg Ile Glu Leu Val Val Glu Ser Ser Ala Asp Asp Leu		
340	345	350
Arg Ala Phe Gln Gln Leu Phe Leu Asn Thr Leu Ser Phe Val Cys Pro		
355	360	365
Trp Cys Ala Ser Gln Gln Thr Ser Gly His His His His His His		
370	375	380

<210> 24  
 <211> 20  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Synthetic

<400> 24  
 tccatgacgt tcctgacgtt

20

<210> 25  
 <211> 18  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Synthetic

<400> 25  
 tctcccagcg tgcgccat

18

<210> 26  
 <211> 30  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Synthetic

57

<400> 26  
accgatgacg tcgccggtga cggcaccacg

30

<210> 27  
<211> 6  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Synthetic

<400> 27  
rrcggyy

6

<210> 28  
<211> 9  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> E.coli

<400> 28  
Thr Ser Gly His His His His His His  
1 5